

# Improving Food Security and Livelihoods at the Interface between Fresh and Saline Water in Bac Lieu, Vietnam



## HIGHLIGHTS

- ✓ Local government revised land-use policies for diversified farming systems, accommodating agriculture and aquaculture
- ✓ Provincial Water Management Bureau adopted recommended sluice procedures
- ✓ Over 8,700 households adopted diversified polyculture systems and technologies
- ✓ Contribution to provincial annual economic growth of 15.7% during 2003-06

Mr. Duy Van Tu in Bac Lieu province shows shrimp caught in his field

## Outcome Stories

Millions of people living in tidal ecosystems in South and Southeast Asia are poor and food-insecure because agricultural production in the dry season is hindered by seawater intrusion. Most management interventions so far have failed to recognize the diversity of rural livelihoods in coastal zones. The environmental consequences of these ill-conceived interventions have been detrimental to water quality and aquatic biodiversity. Conflicts among rice and shrimp farmers and other resource users are a common consequence too.

In the early nineties investments were made in sluice gate construction in the Vietnamese Mekong Delta, to increase rice production. A system of sluice gates

was designed and put into place to keep salty water completely out of zones designated by the provincial government for rice farming, so that a dry-season rice crop could be grown after the main rainy season crop was harvested. In the western part of Bac Lieu province, where saline water is in demand and needed for a highly profitable brackish shrimp industry, this strategy led to conflicts between shrimp and rice farmers. A land zoning scheme adopted in 2002 allowed households to produce intensive rice together with continuous shrimp culture, or wet season rice followed by dry season shrimp, depending on their location and corresponding sluice operation procedures.



**Intensive shrimp cultivation along the coast in Bac Lieu province**

**About CPWF Outcome Stories**

The CPWF Outcome Stories document changes in knowledge, attitudes and practices that have emerged through CPWF-funded research. Outcomes occur when research outputs foster engagement processes that result in changes in practice or changes in behavior. These stories capture outcomes at a specific point in time; outcomes may have evolved since the completion of these projects.

A CGIAR Challenge Program on Water and Food (CPWF) supported research project, “Coastal Resource Management for Improved Livelihoods (CRESMIL),” was implemented from 2004 to 2007, taking this approach further at two coastal sites in the Vietnamese Mekong River Delta and the Ganges Delta in Bangladesh. Taking into account the diverse stakeholder interests and complex, multi-scale interactions at the interface between fresh and saline water, the objective of CRESMIL was to increase land and water productivity to enhance food security and livelihoods. Implemented by a consortium of CGIAR centers and national and local partners, CRESMIL was designed in collaboration with farming communities. CRESMIL identified appropriate integrated approaches to manage land, and fresh and saline water resources, for the benefit of various resource users without adversely affecting the

delicate ecological balance in target areas.

The experience in Bac Lieu province, a coastal province in Vietnam’s Mekong Delta, is presented here. The project carried out socioeconomic surveys to assess the impact of the government’s intervention in water management through salinity control sluices, and found that the intervention had indeed succeeded in controlling saline water intrusion. The balance between fresh water river flows and salt water intrusion from the sea was already changing, and the introduction of fresh water had supported diversification of farming systems in the intervention zone. The intervention, however, was found to have had both positive and negative effects on the livelihoods of farmers. Sometimes, the sluice operation did not suit farmers’ requirements. Farmers appeared to favor community-based water management practices instead of the existing top-down approach.

When the CPWF project started in 2004, the circumstances in Bac Lieu had already changed significantly. Short-duration rice varieties had become available, while the high value and profitability of shrimp production in coastal areas indicated that brackish water was an important resource. Nevertheless, the use of brackish water for shrimp farming in Bac Lieu Province poses environmental and livelihood risks. Farmers face several problems, including shrimp diseases, low shrimp yield, and the degradation of irrigation canals. According to farmers, most of the secondary canals need to be dredged. Monitoring data showed that acidification in canal networks in areas with severely acidic soil was high, particularly at the beginning of the rainy season, and where dredging occurred during the past two to three years. Pollution and acidity appeared to be two important factors driving fish abundance. Pollution becomes a problem when the sluice gates remain closed for extended periods of time. The

Mekong flood is not itself sufficient to dissolve or eliminate the pollution. In fact, it is the marine influence that is most beneficial to the abundance and diversity of aquatic resources in the area.

### Outcomes

The field studies carried out in Vietnam demonstrated that farming diversification and polyculture can considerably increase profitability and reduce risk in both rice- and shrimp-based production systems in the coastal zone. The project designed new zoning for these activities, delineating land use zones with different timing and distribution of fresh and brackish water supply. Some zones were designed to have fresh water all year round, so that they would be suitable for rice and vegetable production. In these freshwater zones, the recommended system is a dry season crop of rice followed by wet season polyculture of rice with fish. Approximately 3,200 farmers in the freshwater zone adopted this system. Other zones



Looking upstream from a sluice

were designed to have fresh water in the wet season and brackish water in the dry season, being suitable for rice-shrimp rotations. In this 'intermediate water quality' zone, a dry season crop of shrimp followed by wet season rice and fish was recommended, but only for areas near the freshwater zone. Yet other zones have brackish water all year round. For these zones the project recommended dry season polyculture of shrimp and crab, followed by fish culture in the wet season. This recommendation was subsequently adopted by 4,300 farmers. Another 1,200 farmers adopted new rice varieties and seeding technologies in cropping systems where rice was a component.

Innovative options for sluice operations to control salinity and acidity now provide suitable water conditions that enable diversified production systems in different

zones. Sophisticated decision models were designed and made available to local government water management offices, which now have the capacity to monitor water quality in their zones and modify sluice operations to ensure desirable water quality, (either saline or fresh), for areas under their control. Local implementation of the revised provincial zoning, based on CPWF research, remained the responsibility of the provincial government. A regional water management alliance for coordination of salinity control has been operating smoothly from 2002 to 2006. Although, it has worked less well since this operational alliance was converted into an official regional river basin organization, that is controlled by the central government. However, it still operates at both provincial and department levels because of the real need for cooperation on salinity control.

## Reference

Tuong, T.P. and C.T. Hoanh. 2009. *Managing water and land resources for sustainable livelihoods at the interface between fresh and saline water environments in Vietnam and Bangladesh*. CPWF Project Report PN10. Colombo, Sri Lanka: CGIAR Challenge Program on Water and Food. [http://results.waterandfood.org/bitstream/handle/10568/3770/PN10\\_IRRI\\_Project%20Report\\_Oct09\\_final.pdf?sequence=1](http://results.waterandfood.org/bitstream/handle/10568/3770/PN10_IRRI_Project%20Report_Oct09_final.pdf?sequence=1)

## Project Partners

Bac Lieu People's Committee  
Bangladesh Fisheries Research Institute  
Bangladesh Rice Research Can Tho University  
International Rice Research Institute (IRRI)  
International Water Management Institute (IWMI)  
SocioConsult Ltd.  
WorldFish Center



Andes • Ganges • Limpopo • **Mekong** • Nile • Volta

## About CPWF

The Challenge Program on Water and Food was launched in 2002. CPWF aims to increase the resilience of social and ecological systems through better water management for food production (crops, fisheries and livestock). CPWF currently works in six river basins globally: Andes, Ganges, Limpopo, Mekong, Nile and Volta.

CPWF is a member of the CGIAR Water, Land and Ecosystems Research Program. The program focuses on the three critical issues of water scarcity, land degradation and ecosystem services, as well as sustainable natural resource management. CGIAR is a global agriculture research partnership for a food secure future. Its science is carried out by the 15 research centers who are members of the CGIAR Consortium in collaboration with hundreds of partner organizations.

[www.cgiar.org](http://www.cgiar.org)

## Mailing address

CGIAR Challenge Program on Water and Food  
P.O. Box 2075  
127 Sunil Mawatha  
Pelawatta, Battaramulla,  
Sri Lanka  
T: +94 11 288 0143  
F: +94 11 278 4083  
E: [cpwfsecretariat@cgiar.org](mailto:cpwfsecretariat@cgiar.org)